

## CLAIMS

1. A solid polymer cell assembly comprising a cell assembly (10) formed by juxtaposing a plurality of unit cells (12) such that electrode surfaces of said unit cells (12) are aligned in parallel with each other, said unit cell (12) each having an assembly (18) including an anode (26a), a cathode (24a), and a solid polymer electrolyte membrane (22a) interposed between said anode (26a) and said cathode (24a),

wherein said unit cells includes an upstream unit cell (12) provided on the upstream side in a flow direction of a reactant gas including at least one of an oxygen-containing gas and a fuel gas, and a downstream unit cell (14) provided on the downstream side in the flow direction; and

at least part of a reactant gas flow passage (32) for said reactant gas extends serially from a passage (38) formed on an upper side of the assembly (18) of said upstream unit cell (12) to a passage (42) formed on a lower side of the assembly (20) of said downstream unit cell (14).

2. A cell assembly according to claim 1, wherein said reactant gas flow passage includes a fuel gas flow passage (34) and an oxygen-containing gas flow passage (32), and the oxygen-containing gas and the fuel gas flows in a counterflow manner in the oxygen-containing gas flow passage (32) and the fuel gas flow passage (34) along both surfaces

of the assemblies (18) of said unit cells (12).

3. A cell assembly according to claim 2, wherein said unit cells include an upstream unit cell (12) provided on the upstream side in a flow direction of the oxygen-containing gas, and a downstream unit cell (14) provided on the downstream side in the flow direction of the oxygen-containing gas; and

a coolant flow passage (36) is provided such that a coolant flows serially from said upstream unit cell (12) provided on the upstream side in the flow direction of the oxygen-containing gas to said downstream unit cell (14) provided on the downstream side in the flow direction of the oxygen-containing gas so that temperature of said downstream unit cell (14) provided on the downstream side in the flow direction of the oxygen-containing gas is kept higher than temperature of said upstream unit cell (12) provided on the upstream side in the flow direction of the oxygen-containing gas.

4. A cell assembly according to claim 3, wherein structure of said upstream unit cell (12) is different from structure of said downstream unit cell (14).

5. A cell assembly according to claim 4, the assembly (18) of said upstream unit cell (12) and the assembly (20) of said downstream unit cell (14) have the same power

generation performance when the assembly (18) of said upstream unit cell (12) is operated at a low temperature in comparison with the assembly (20) of said downstream unit cell (14).

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6. A cell assembly according to claim 4 or 5, wherein said cathode (24a) of the assembly (18) of said upstream unit cell (12) has a hydrophobic diffusion layer having low porosity, and said anode (26a) of the assembly (18) of said upstream unit cell (12) has a hydrophilic diffusion layer having high porosity; and

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said hydrophobic diffusion layer having low porosity is provided on the upper side, and said hydrophilic diffusion layer having high porosity is provided on the lower side.

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7. A cell assembly according to any one of claims 4 to 6, wherein said anode (26b) of the assembly (20) of said downstream unit cell (14) has a hydrophobic diffusion layer having low porosity, and said cathode (24b) of the assembly (20) of said downstream unit cell (14) has a hydrophilic diffusion layer having high porosity; and

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said hydrophobic diffusion layer having low porosity is provided on the upper side, and said hydrophilic diffusion layer having high porosity is provided on the lower side.

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8. A cell assembly according to any one of claims 1 to 7, wherein a connection passage member (16) is provided

between said juxtaposed unit cells (12, 14); and

a reactant gas connection passage (40) and a coolant connection passage (52) are formed in said connection passage member (16) for serially supplying the reactant gas and the coolant.